

9 of freedom, said center of mass of said carriage assembly lying substantially
10 on said optical axis proximate said center of mass of said suspended body,
11 said optical axis being at said initial position, said initial position defining a first
12 radial distance between said initial position and said center of said storage
13 medium, said storage medium having an initial circumferential velocity about
14 said center of said storage medium;

15 a drive producing a plurality of forces that are balanced and symmetric
16 about said optical axis for driving said carriage from said initial position to said
17 target position, said target position defining a second radial distance between
18 said target position and said center of said storage medium, said target position
19 further defining a circumferential distance between said initial position and said
20 target position parallel to said circumference of said storage medium; and

21 a processor for determining a velocity trajectory relative to said first radial
22 distance, said second radial distance, said circumferential distance and said
23 initial circumferential velocity, said processor directing said drive to move said
24 carriage assembly from said initial position to said target position with said
25 velocity trajectory, so that said carriage assembly will arrive radially and
26 circumferentially at said target position at substantially the same time and
27 moments produced by said plurality of forces are effectively absent.

1 18. An apparatus according to claim 17 further comprising a rotational
2 drive for rotating said medium relative to said carriage assembly, said rotational
3 drive rotating said medium at said initial circumferential velocity when said
4 carriage is at said initial position and rotating said medium at a target
5 circumferential velocity when said carriage is at said target position, said
6 processor including said target circumferential velocity in determining said
7 velocity trajectory.

1 19. An apparatus according to claim 18 wherein said rotational drive
2 rotates said medium at said target circumferential velocity before said carriage
3 arrives said target position.

1 20. An apparatus according to claim 18 wherein said rotational drives
2 rotates said medium at said target circumferential velocity at substantially the
3 same time as said carriage assembly arrives at said target position.

1 21. An apparatus according to any of claims 17-20 wherein said
2 processor is a digital signal processor.

1 22. An apparatus for moving a carriage assembly from an initial position
2 to a target position through an intermediate position relative to a storage
3 medium having a center and a circumference and rotating relative to said
4 carriage assembly at a circumferential velocity about said center, said
5 apparatus comprising:

6 a suspended body having a center of mass and a lens defining an optical
7 axis, said center of mass being disposed substantially on said optical axis, said
8 carriage assembly suspending said suspended body at a first position relative
9 to said carriage assembly for relative motion thereto with at least one degree
10 of freedom, said center of mass of said carriage assembly lying substantially
11 on said optical axis proximate said center of mass of said suspended body,
12 said optical axis being at said initial position, said intermediate position defining
13 a first radial distance between said intermediate position and said center of said
14 storage medium, said storage medium having an initial circumferential velocity
15 about said center of said storage medium;

16 a drive producing a plurality of forces that are balanced and symmetric
17 about said optical axis for driving said carriage from said initial position to said

18 target position, said target position defining a second radial distance between
19 said target position and said center of said storage medium, said target position
20 further defining a circumferential distance between said intermediate position
21 and said target position parallel to said circumference of said storage medium;
22 and

23 a processor for determining a velocity trajectory relative to said first radial
24 distance, said second radial distance, said circumferential distance and said
25 initial circumferential velocity, said processor directing said drive to move said
26 carriage assembly from said initial position to said target position at an initial
27 velocity trajectory and from said intermediate position to said target position at
28 said velocity trajectory, so that said carriage assembly will arrive radially and
29 circumferentially at said target position at substantially the same time and
30 moments produced by said plurality of forces are effectively absent.

31 23. An apparatus according to claim 22 further comprising a rotational
32 drive for rotating said medium relative to said carriage assembly, said rotational
33 drive rotating said medium at said initial circumferential velocity when said
34 carriage is at said initial position and rotating said medium at a target
35 circumferential velocity when said carriage is at said target position, said
36 processor including said target circumferential velocity in determining said
37 velocity trajectory.

1 24. An apparatus according to claim 23 wherein said rotational drive
2 rotates said medium at said target circumferential velocity before said carriage
3 arrives said target position.

1 25. An apparatus according to claim 23 wherein said rotational drives
2 rotates said medium at said target circumferential velocity at substantially the
3 same time as said carriage assembly arrives at said target position.

1 26. An apparatus according to any of claims 22-25 wherein said
2 processor is a digital signal processor.

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1 27. An apparatus for moving a carriage assembly from an initial position
2 to a target position relative to a storage medium having a center and a
3 circumference and rotating relative to said carriage assembly at a circumfer-
4 ential velocity about said center, said apparatus comprising:
5 a suspended body having a center of mass and a lens defining an optical
6 axis, said center of mass being disposed substantially on said optical axis, said
7 carriage assembly suspending said suspended body at a first position relative
8 to said carriage assembly for relative motion thereto with at least one degree
9 of freedom, said center of mass of said carriage assembly lying substantially
10 on said optical axis proximate said center of mass of said suspended body,
11 said optical axis being at said initial position, said initial position defining a
12 radial distance between said initial position and said target position, said
13 storage medium having an initial circumferential velocity about said center of
14 said storage medium;
15 a drive producing a plurality of forces that are balanced and symmetric
16 about said optical axis for driving said carriage from said initial position to said
17 target position, said target position defining a circumferential distance between
18 said initial position and said target position parallel to said circumference of
19 said storage medium; and
20 a processor for determining a velocity trajectory relative to said radial
21 distance, said circumferential distance and said initial circumferential velocity,

22 said processor directing said drive to move said carriage assembly from said
23 initial position to said target position with said velocity trajectory, so that said
24 carriage assembly will arrive radially and circumferentially at said target position
25 at substantially the same time and moments produced by said plurality of
26 forces are effectively absent.

1 28. An apparatus according to claim 27 further comprising a rotational
2 drive for rotating said medium relative to said carriage assembly, said rotational
3 drive rotating said medium at said initial circumferential velocity when said
4 carriage is at said initial position and rotating said medium at a target
5 circumferential velocity when said carriage is at said target position, said
6 processor including said target circumferential velocity in determining said
7 velocity trajectory.

1 29. An apparatus according to claim 28 wherein said rotational drive
2 rotates said medium at said target circumferential velocity before said carriage
3 arrives said target position.

1 30. An apparatus according to claim 28 wherein said rotational drive
2 rotates said medium at said target circumferential velocity at substantially the
3 same time as said carriage assembly arrives at said target position.

1 31. An apparatus according to any of claims 27-30 wherein said
2 processor is a digital signal processor.

1 32. An apparatus for moving a carriage assembly from an initial position
2 to a target position through an intermediate position relative to a storage
3 medium having a center and a circumference and rotating relative to said

4 carriage assembly at a circumferential velocity about said center, said
5 apparatus comprising:

6 a suspended body having a center of mass and a lens defining an optical
7 axis, said center of mass being disposed substantially on said optical axis, said
8 carriage assembly suspending said suspended body at a first position relative
9 to said carriage assembly for relative motion thereto with at least one degree
10 of freedom, said center of mass of said carriage assembly lying substantially
11 on said optical axis proximate said center of mass of said suspended body,
12 said optical axis being at said initial position, said intermediate position defining
13 a radial distance between said intermediate position and said target position,
14 said storage medium having an initial circumferential velocity about said center
15 of said storage medium;

16 a drive producing a plurality of forces that are balanced and symmetric
17 about said optical axis for driving said carriage from said initial position to said
18 target position, said target position defining a circumferential distance between
19 said intermediate position and said target position parallel to said circumfer-
20 ence of said storage medium; and

21 a processor for determining a velocity trajectory relative to said radial
22 distance, said circumferential distance and said initial circumferential velocity,
23 said processor directing said drive to move said carriage assembly from said
24 initial position to said target position at an initial velocity trajectory and from said
25 intermediate position to said target position at said velocity trajectory, so that
26 said carriage assembly will arrive radially and circumferentially at said target
27 position at substantially the same time and moments produced by said plurality
28 of forces are effectively absent.

1 33. An apparatus according to claim 32 further comprising a rotational
2 drive for rotating said medium relative to said carriage assembly, said rotational

3 drive rotating said medium at said initial circumferential velocity when said
4 carriage is at said initial position and rotating said medium at a target
5 circumferential velocity when said carriage is at said target position, said
6 processor including said target circumferential velocity in determining said
7 velocity trajectory.

1 34. An apparatus according to claim 33 wherein said rotational drive
2 rotates said medium at said target circumferential velocity before said carriage
3 arrives said target position.

1 35. An apparatus according to claim 33 wherein said rotational drives
2 rotates said medium at said target circumferential velocity at substantially the
3 same time as said carriage assembly arrives at said target position.

1 36. An apparatus according to any of claims 32-35 wherein said
2 processor is a digital signal processor.

Concluding Matters

Examiner has required Applicant to submit a new set of drawing figures. Applicant herein submits an amendment to the informal drawing figures and two sets of formal drawing figures.

Examiner has objected to the drawings under 37 C.F.R. 1.83(a) as not showing every feature of the invention specified in the claims. Applicant believes that the invention specified by Applicant's new claims are clearly shown in the drawings.

Examiner has requested Applicant to submit a clear and corrected continuation data of this application. As shown on page one of the substitute specification, "This application is a divisional of U.S. patent application Ser. No.